Lecture Module - Sensors

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

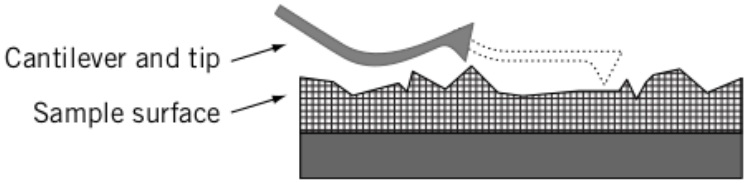
Topic 1 - Introduction and Overview

Topic 1 - Introduction and Overview

- Classification of Sensors
- Analog and Digital Sensors
- Example 1: Distance or Range
- Example 2: Rotation

Classification of Sensors

a sensor, a physical element that employs some natural phenomenon...
...to sense the variable being measured



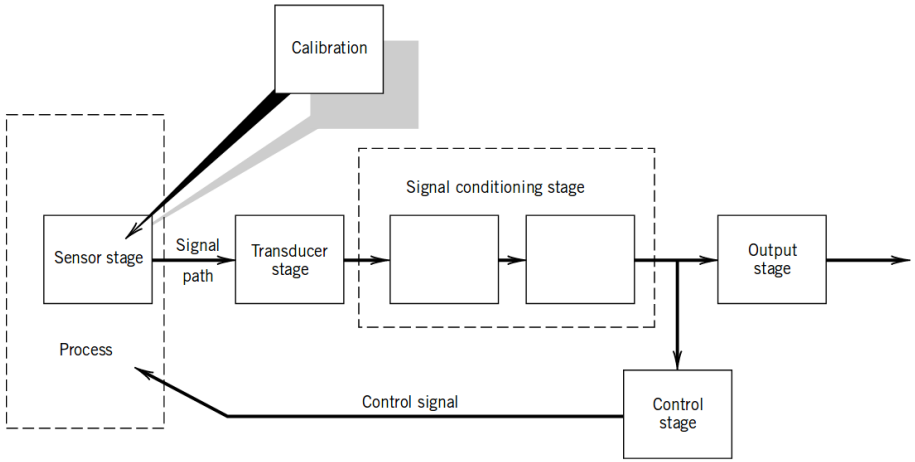


Figure 1.5 Components of a general measurement system.

Image: Theory and Design of Mech. Meas.

Classification of Sensors

Generate ideas as a group.

Classification of Sensors

(space for more ideas)

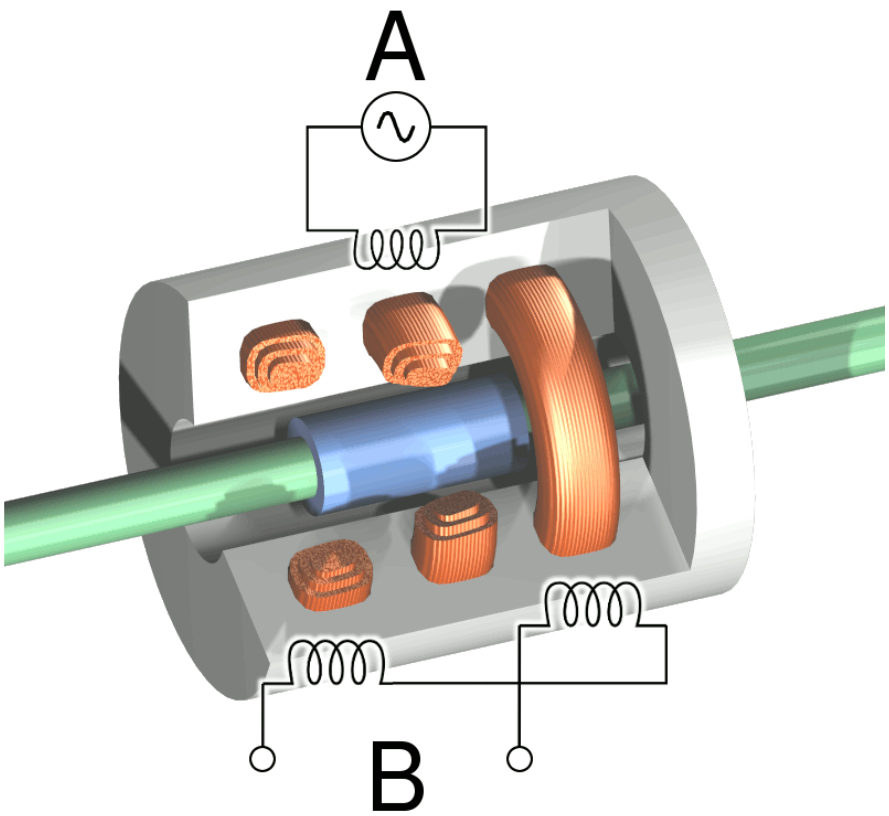
Analog and Digital Sensors

Analog	Digital	Both?

Example 1: Distance or Range

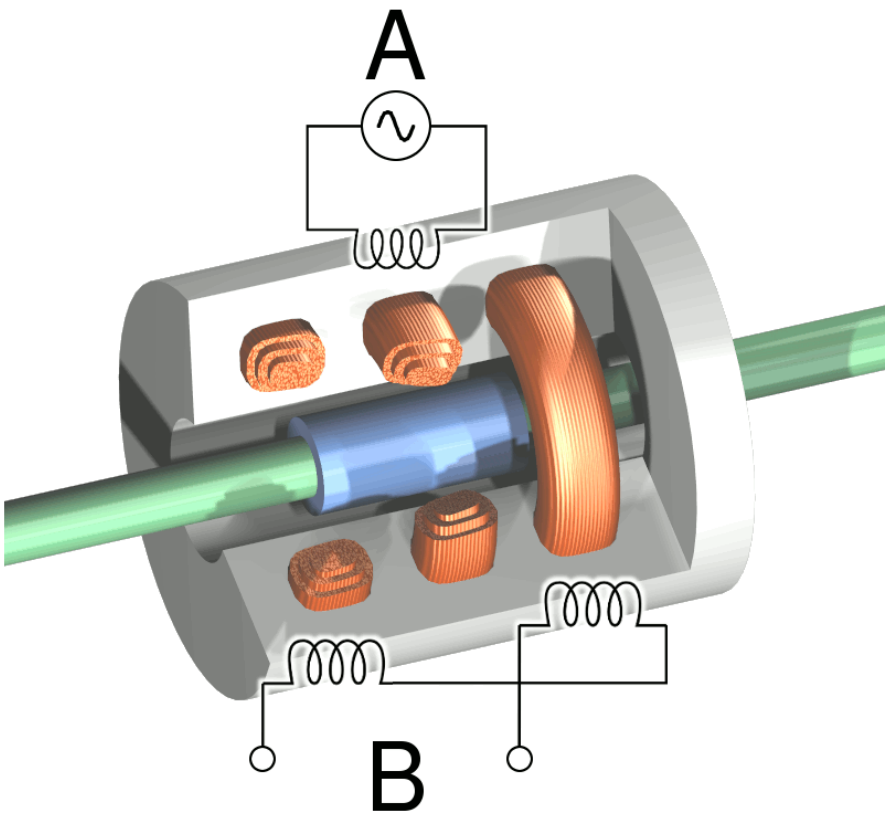
Thought Exercise: How do we measure distance (aka range)?

Example 1: Distance or Range



LVDTs with NI
LVDT Animation

Example 1: Distance or Range



Example 2: Rotation

Thought Exercise: How do we measure rotation?

- What variable or quantity is used to describe rotation?
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  -
  -
- What type of sensor is used to measure this?
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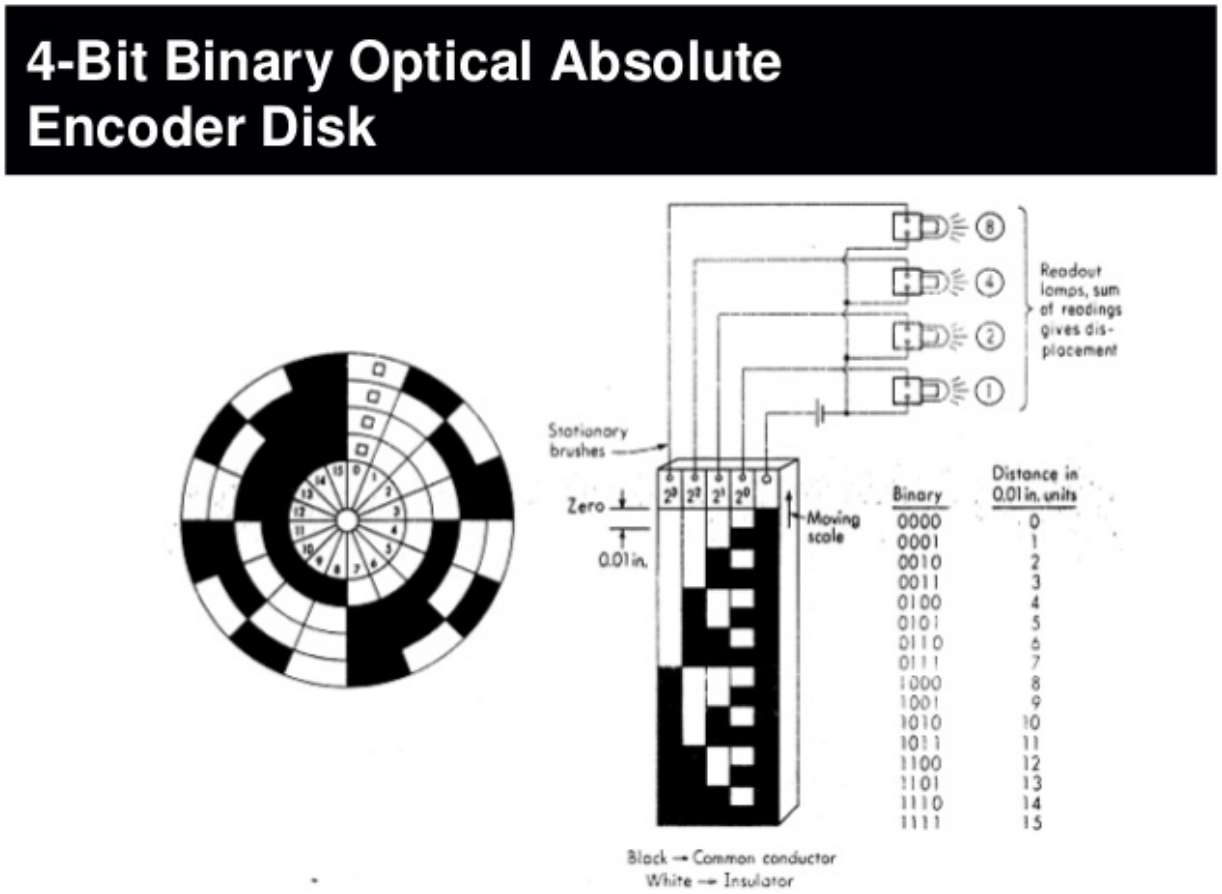
  -
  -

Example 2: Rotation

Rotational Potentiometer

Example 2: Rotation

Absolute Encoder

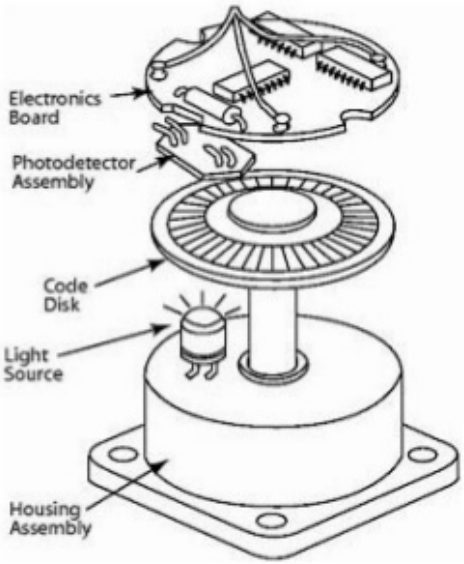


Example 2: Rotation

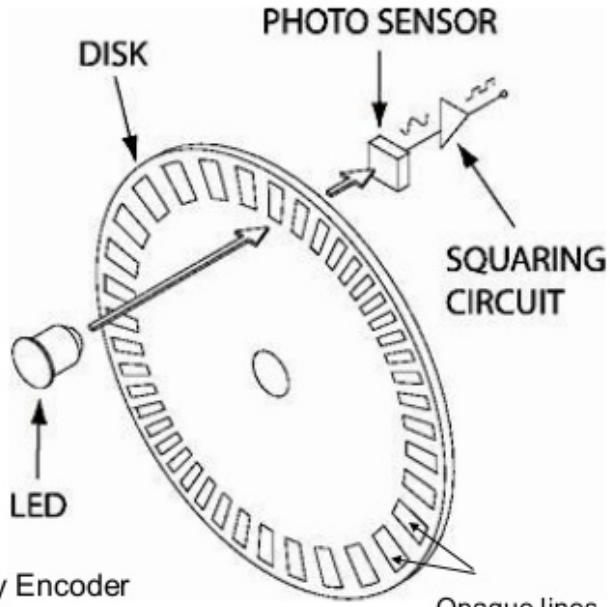
Incremental Encoder

2. Types of Rotary Encoder - Incremental

Construction of Incremental Rotary Encoder



Components inside Incremental Rotary Encoder



Example 2: Rotation

- What applications require this type of sensor?
  -
  -
  -

Example 2: Rotation

- How does this type of sensor work?
  -
  -
  -

Example 3: Orientation

Thought Exercise: How do we measure orientation?

- What variable or quantity is used to describe orientation?
  -
  -
  -
- What type of sensor is used to measure this?
  -
  -
  -

Example 3: Orientation

- What applications require this type of sensor?
  -
  -
  -

Example 3: Orientation

- How does this type of sensor work?